

1      **CLAIMS**

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3      1. An apparatus configured to manage installation of operating systems on a  
4      plurality of computing devices, wherein the installation is performed across the  
5      plurality of computing devices both concurrently and asynchronously.

6

7      2. An apparatus as recited in claim 1, wherein the installation comprises  
8      transferring multiple portions of data to each of the plurality of computing devices,  
9      and wherein some of the multiple portions are transferred to the plurality of  
10     computing devices concurrently and other of the multiple portions are transferred  
11     to the plurality of computing devices asynchronously.

12

13     3. An apparatus as recited in claim 2, wherein the portions that are transferred  
14     to the plurality of computing devices concurrently are larger than the portions  
15     transferred to the plurality of computing devices asynchronously.

16

17     4. An apparatus as recited in claim 2, wherein the portions that are transferred  
18     to the plurality of computing devices concurrently comprise an image of the  
19     operating system being deployed.

1       5. An apparatus as recited in claim 1, wherein installation of the operating  
2 systems is performed in multiple steps, and wherein the apparatus is configured to  
3 perform a first set of the multiple steps asynchronously across the plurality of  
4 computing devices, and, after a particular one of the multiple steps is completed,  
5 to perform one or more of the remaining steps of the multiple steps concurrently  
6 across the plurality of computing devices.

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8       6. An apparatus as recited in claim 5, wherein the one or more remaining steps  
9 includes a step of downloading an operating system image to the plurality of  
10 computing devices.

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12      7. An apparatus as recited in claim 1, wherein the apparatus further comprises:  
13            a controller to maintain a record of the plurality of computing devices being  
14 managed by the apparatus;  
15            a network boot service to control how the plurality of computing devices  
16 are to boot; and  
17            an image distribution service to store one or more operating system images  
18 that can be installed as the operating system for one or more of the plurality of  
19 computing devices.

20  
21      8. An apparatus as recited in claim 1, wherein the apparatus further comprises  
22 a network boot service to:  
23            receive, from one of the plurality of computing devices, information  
24 describing hardware installed on the computing device; and

1 use the received information to generate a deployment agent to be  
2 downloaded to the computing device and used to install the operating system on  
3 the computing device.

4

5 9. An apparatus as recited in claim 1, wherein the installation comprises  
6 maintaining a record of what operations are performed when installing the  
7 operating systems on the plurality of computing devices.

8

9 10. A method of deploying an operating system on a plurality of computing  
10 devices, the method comprising:

11 performing a first portion of an installation process on each of the plurality  
12 of computing devices asynchronously across the plurality of computing devices;  
13 and

14 performing a second portion of the installation process on each of the  
15 plurality of computing devices concurrently.

16

17 11. A method as recited in claim 10, wherein performing the second portion  
18 comprises downloading an operating system image to the plurality of computing  
19 devices.

20

21 12. A method as recited in claim 10, wherein performing the first portion  
22 comprises:

23 downloading a deployment agent loader to obtain, from each of the  
24 plurality of computing devices, information describing hardware installed on each  
25 of the plurality of computing devices; and

1       downloading, to each of the plurality of computing devices, a deployment  
2       agent, wherein the deployment agent downloaded to a particular computing device  
3       is generated based on the received information regarding the particular computing  
4       device.

5

6       13. A method as recited in claim 10, further comprising adding an indication of  
7       the installation process performed on each of the plurality of computing devices to  
8       a log.

9

10      14. One or more computer readable media having stored thereon a plurality of  
11       instructions that, when executed by one or more processors, causes the one or  
12       more processors to:

13           receive, from each of a plurality of computing devices, an indication that  
14       the computing device is to have an operating system installed on the computing  
15       device;

16           for each of the plurality of computing devices, identify, in response to  
17       receiving the indication, a set of steps to be taken in order to install an operating  
18       system on the computing device; and

19           control installation of the operating systems on the plurality of computing  
20       devices asynchronously and in parallel.

21

22       15. One or more computer readable media as recited in claim 14, wherein the  
23       indication that the computing device is to have an operating system installed is an  
24       indication that the computing device has been powered-on.

1       **16.** One or more computer readable media as recited in claim 14, wherein one  
2       or more of the plurality of computing devices currently has no operating system  
3       installed.

4

5       **17.** One or more computer readable media as recited in claim 14, wherein one  
6       or more of the plurality of computing devices currently has an operating system  
7       installed.

8

9       **18.** One or more computer readable media as recited in claim 14, wherein the  
10      installation comprises transferring multiple portions of data to each of the plurality  
11      of computing devices, and wherein some of the multiple portions are transferred to  
12      the plurality of computing devices in parallel and other of the multiple portions are  
13      transferred to the plurality of computing devices asynchronously.

14

15      **19.** One or more computer readable media as recited in claim 18, wherein the  
16      portions that are transferred to the plurality of computing devices in parallel are  
17      larger than the portions transferred to the plurality of computing devices  
18      asynchronously.

19

20      **20.** One or more computer readable media as recited in claim 18, wherein the  
21      portions that are transferred to the plurality of computing devices in parallel  
22      comprise an image of the operating system being deployed.

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1       **21.** One or more computer readable media as recited in claim 14, wherein the  
2 instructions cause the one or more processors to perform multiple steps of the set  
3 of steps asynchronously across the plurality of computing devices, and, after a  
4 particular one of the set of steps is completed, to perform one or more of the  
5 remaining steps of the set of steps in parallel across the plurality of computing  
6 devices.

7  
8       **22.** One or more computer readable media as recited in claim 21, wherein the  
9 one or more remaining steps includes a step of downloading an operating system  
10 image to the plurality of computing devices.

11  
12      **23.** One or more computer readable media as recited in claim 14, wherein the  
13 plurality of instructions further cause the one or more processors to:

14           receive, from one of the plurality of computing devices, information  
15 describing hardware installed on the computing device; and

16           use the received information to generate a deployment agent to be  
17 downloaded to the computing device and used to install the operating system on  
18 the computing device.

19  
20      **24.** One or more computer readable media as recited in claim 14, wherein the  
21 set of steps includes steps of:

22           downloading a deployment agent loader to one of the plurality of  
23 computing devices;

24           receiving, from the deployment agent loader, information describing  
25 hardware installed on the one computing device;

1           dynamically generating a deployment agent for the one computing device  
2 based at least in part on the hardware installed on the one computing device; and  
3           downloading the dynamically generated deployment agent to the one  
4 computing device.

5

6   **25.** One or more computer readable media as recited in claim 24, wherein the  
7 set of steps further includes:

8           downloading, in response to a request received from the deployment agent  
9 on the one computing device, an image of an operating system to the one  
10 computing device.

11

12   **26.** One or more computer readable media as recited in claim 14, wherein the  
13 plurality of instructions further cause the one or more processors to log, for each  
14 of the plurality of computing devices, the set of steps taken in order to install the  
15 operating system on the computing device.

16

17   **27.** A method comprising:

18           identifying, for each of a plurality of devices, a process to be followed to  
19 install an operating system on the device; and  
20           controlling, in parallel and asynchronously, installation of the operating  
21 systems on the plurality of devices.

22

23   **28.** A method as recited in claim 27, wherein the same operating system is to  
24 be installed on each of the plurality of devices.

1       29. A method as recited in claim 27, wherein a different operating system is to  
2       be installed on at least a subset of the plurality of devices.

3  
4       30. A method as recited in claim 27, wherein one or more of the plurality of  
5       devices currently has no operating system installed.

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7       31. A method as recited in claim 27, wherein one or more of the plurality of  
8       devices currently has an operating system installed.

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10      32. A method as recited in claim 27, wherein the installation comprises  
11       transferring multiple portions of data to each of the plurality of devices, and  
12       wherein some of the multiple portions are transferred to the plurality of devices in  
13       parallel and other of the multiple portions are transferred to the plurality of devices  
14       asynchronously.

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16      33. A method as recited in claim 32, wherein the portions that are transferred  
17       to the plurality of devices in parallel are larger than the portions transferred to the  
18       plurality of devices asynchronously.

19  
20      34. A method as recited in claim 32, wherein the portions that are transferred  
21       to the plurality of devices in parallel comprise an image of the operating system  
22       being deployed.

1       **35.** A method as recited in claim 27, wherein the installation comprises  
2       performing a set of steps, and performing multiple steps of the set of steps  
3       asynchronously across the plurality of devices, and, after a particular one of the set  
4       of steps is completed, performing one or more of the remaining steps of the set of  
5       steps in parallel across the plurality of devices.

6

7       **36.** A method as recited in claim 35, wherein the one or more remaining steps  
8       includes a step of downloading an operating system image to the plurality of  
9       devices.

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11      **37.** A system for deploying an operating system on a plurality of computing  
12       devices, the system comprising:

13           means for performing a first portion of an installation process on each of  
14       the plurality of computing devices asynchronously across the plurality of  
15       computing devices; and

16           means for performing a second portion of the installation process on each  
17       of the plurality of computing devices concurrently.

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19      **38.** A system as recited in claim 37, wherein the means for performing the  
20       second portion comprises means for downloading an operating system image to  
21       the plurality of computing devices.

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